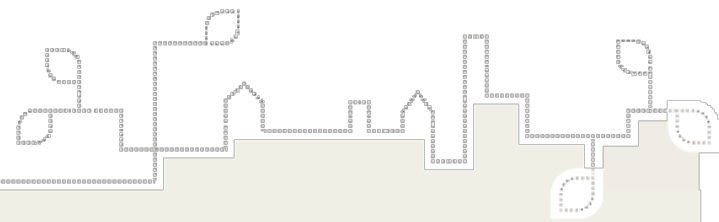


# Using HIAs as a Green Building Design Tool to Enhance Resilience to Climate Change

National Health Impact Assessment Meeting  
September 25, 2013

**ADELE HOUGHTON**, AIA, MPH  
*President, Biositu, LLC*



# Overview

1. Localized Health Effects of Climate Change
2. Role of HIAs in Land Use & Development - example from AK
3. Green Buildings as a Tool for Climate Change Resilience
4. Applying HIAs as a Green Building Design Tool to Enhance Resilience to Climate Change

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# Health Impacts of Climate Change

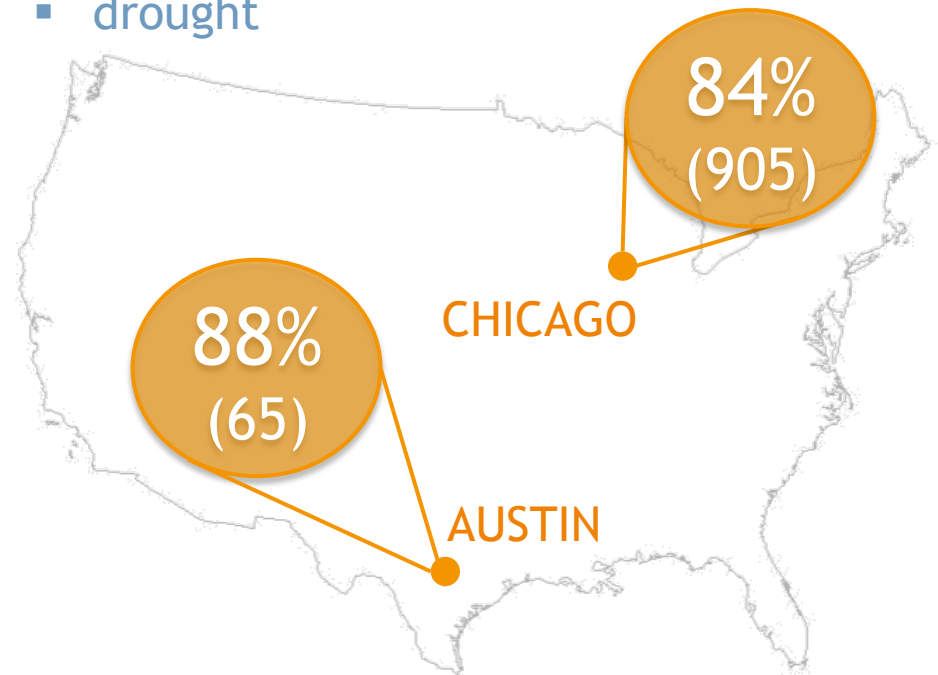
## Global Perspective: Projected Negative Health Impacts of Climate Change

	Negative impact	Positive impact
<b>Very high confidence</b>		
Malaria: contraction and expansion, changes in transmission season	←	→
<b>High confidence</b>		
Increase in malnutrition	←	
Increase in the number of people suffering from deaths, disease and injuries from extreme weather events	←	
Increase in the frequency of cardio-respiratory diseases from changes in air quality	←	
Change in the range of infectious disease vectors	←	→
Reduction of cold-related deaths		→
<b>Medium confidence</b>		
Increase in the burden of diarrhoeal diseases	←	

Source: Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007

## Local Perspective (Austin, Chicago): Deaths from Climate Change-Related Natural Hazards, 1970-2010

- extreme heat
- severe storm/flooding
- drought

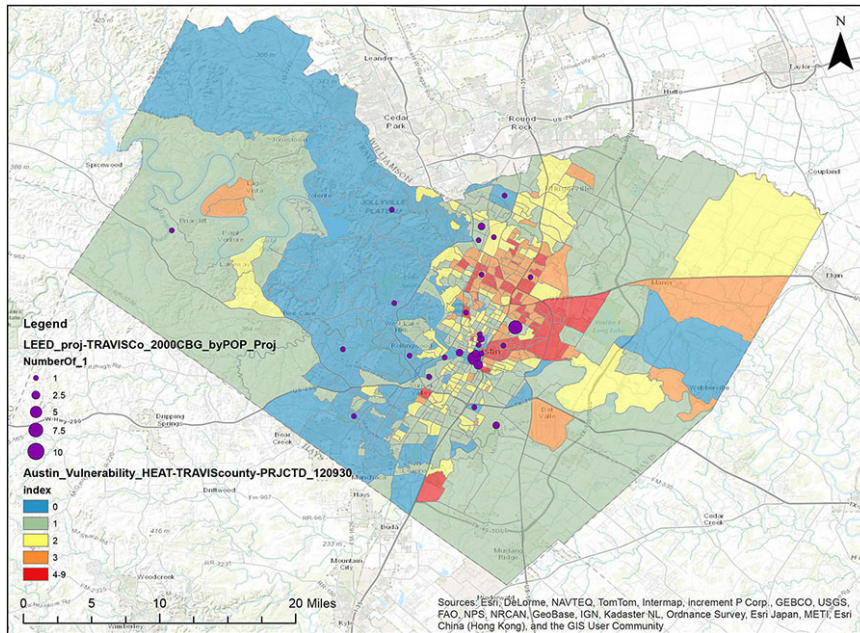


Source: Spatial Hazard Events and Losses Database for the United States, Version 9.0. Hazards & Vulnerability Research Institute, University of South Carolina.

# Climate Change Vulnerability

## Heat Vulnerability Index

Overlaid with Number of LEED Certified Projects

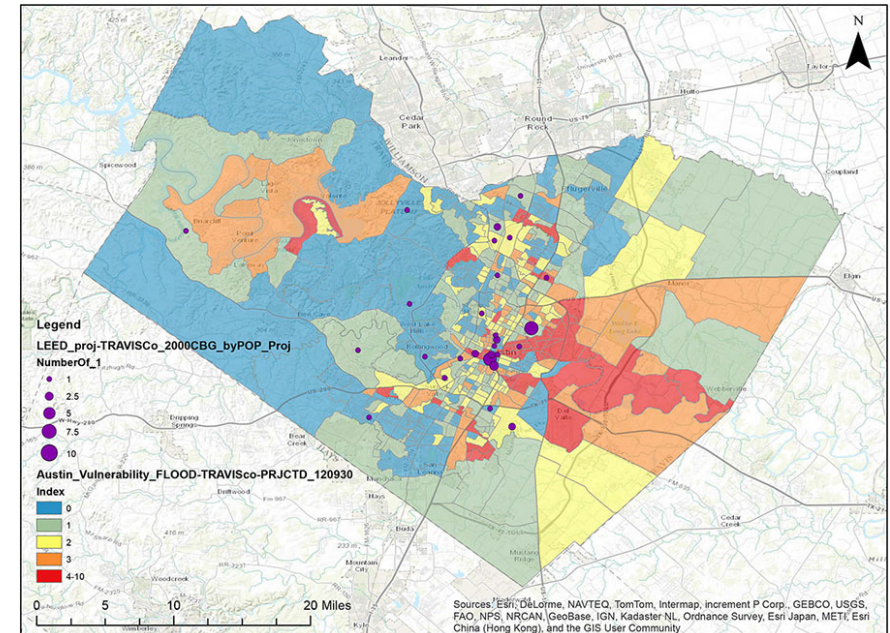


### Variables

- Lack of Green Space
- Average Ambient Surface Temperature
- Population Density
- Age 65+
- Non-Hispanic African Americans

## Flood Vulnerability Index

Overlaid with Number of LEED Certified Projects

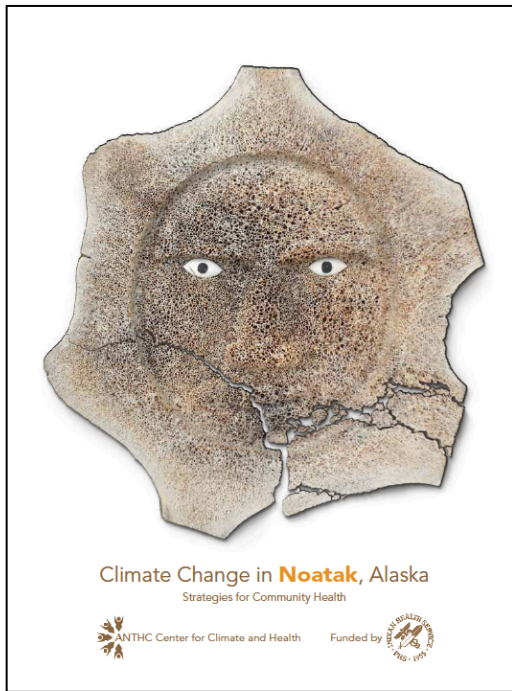


### Variables

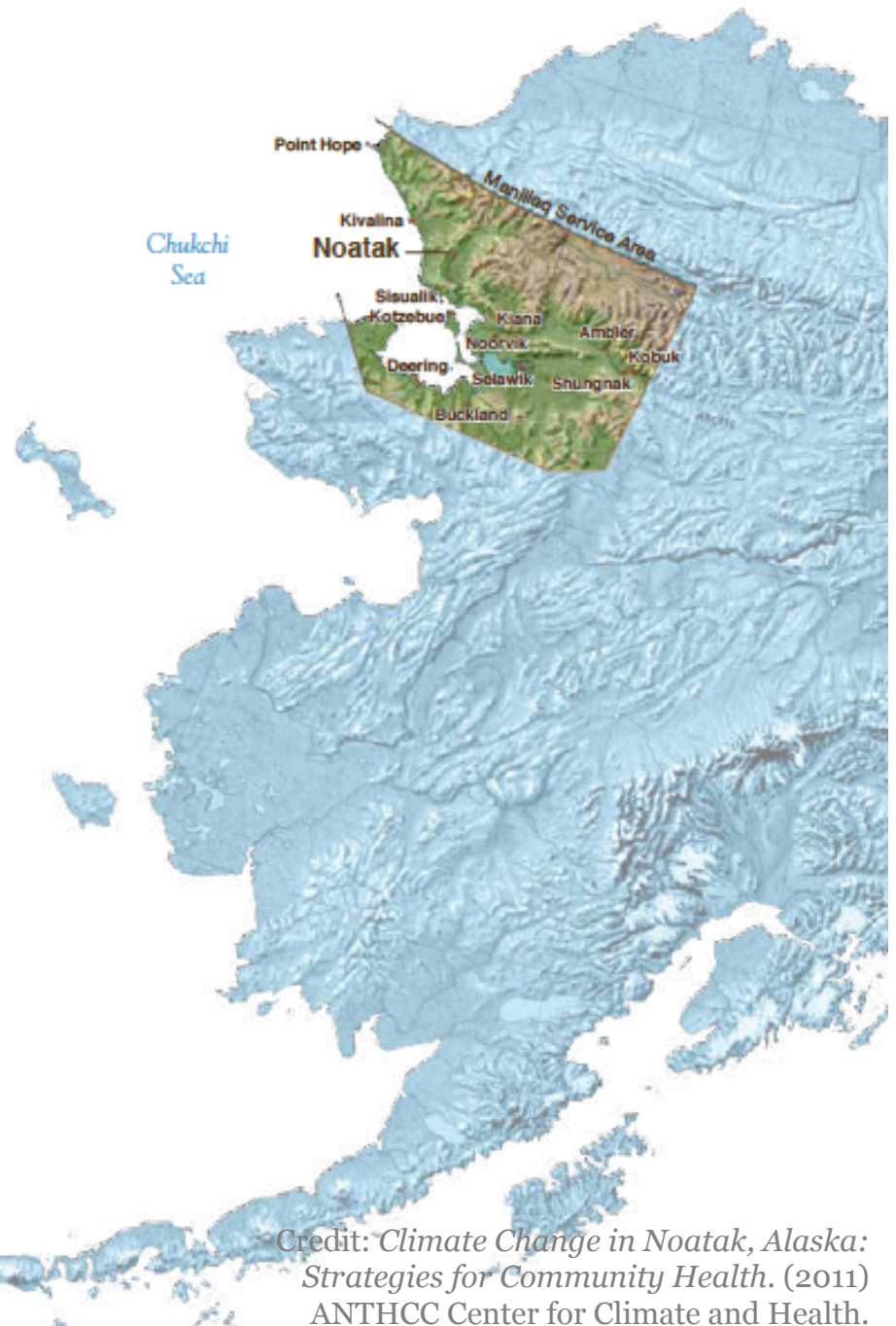
- Floodplain Ratio
- Low-Water Crossing Density
- Socially Isolated (i.e. living alone)
- Renters Status
- Hispanic Population

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- 500 residents
- No road access
- Mostly Inupiat
- Economy dominated by subsistence activities



# Centralized Water & Wastewater Infrastructure

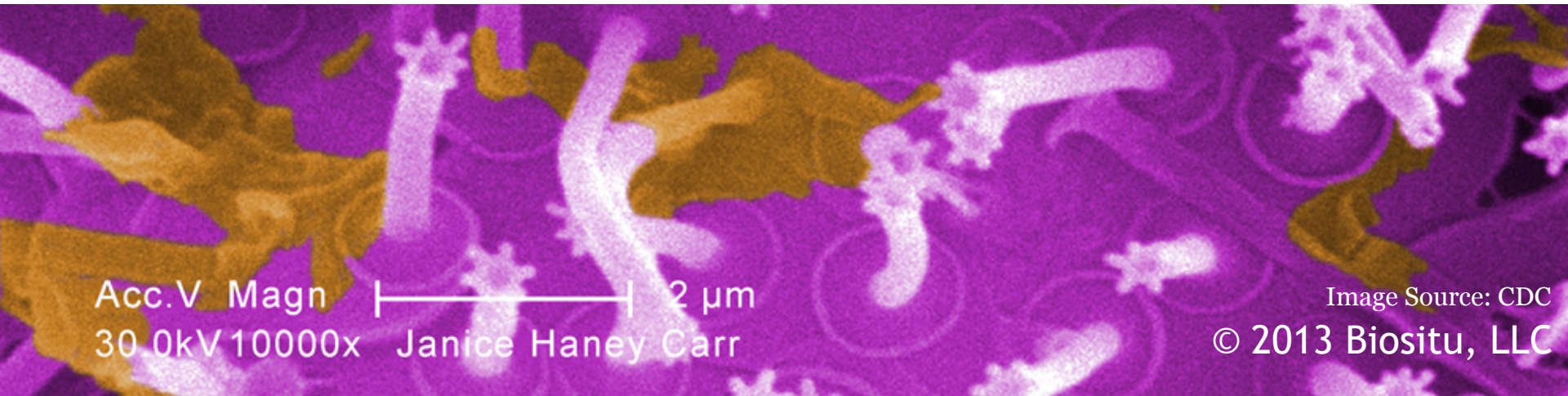
- Seasonal water shortages
- Seasonal compromised water quality
- Wastewater plant's foundation subsiding & cracking
- Risk of fuel shortages





# Health Risks

- Water shortages
- Exposure to waterborne contaminants such as giardia from compromised water quality
- Risk of infections due to Interruption of services
- Compromised food security



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30.0kV 10000x Janice Haney Carr

Image Source: CDC  
© 2013 Biositu, LLC

# Imagine you were designing a replacement health clinic...



Image Credit: Noatak Health Clinic.

Photo Credit: Michael Brubaker, 2010.

Source: *Climate Change in Noatak, Alaska: Strategies for Community Health*. (2011) ANTHCC Center for Climate and Health.

Map Credit: Google Maps 2011

© 2013 Biositu, LLC

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# Study Definition of Green Building: Leadership in Energy & Environmental Design (LEED®)

## Credit Categories

Sustainable Sites

Water Efficiency

Energy & Atmosphere

Materials & Resources

Indoor Environmental Quality

Innovation



Opportunity:  
Enhance  
community  
resilience to  
climatic events.



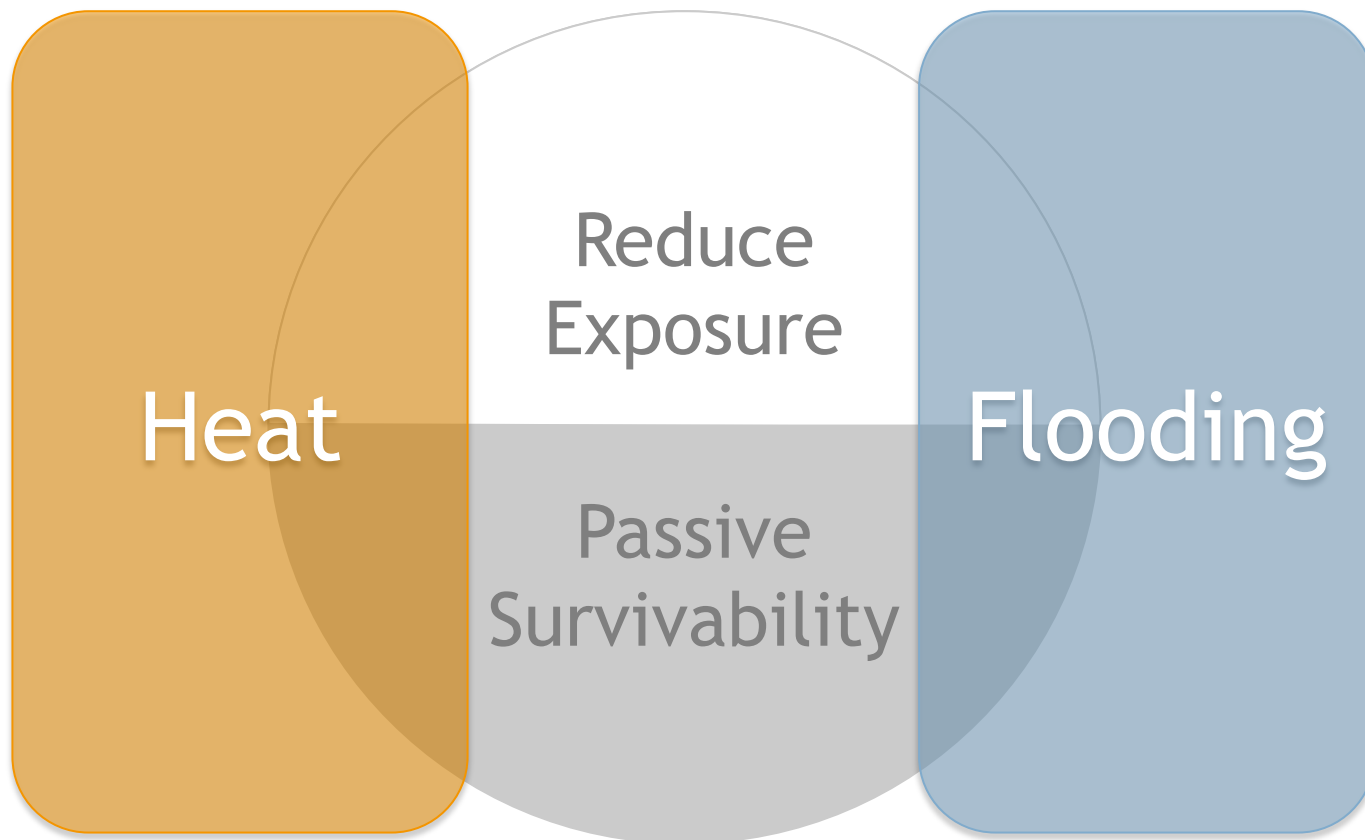
# Green Building & Climate Change Vulnerability

## Literature Review of LEED Strategies (Sample Results)

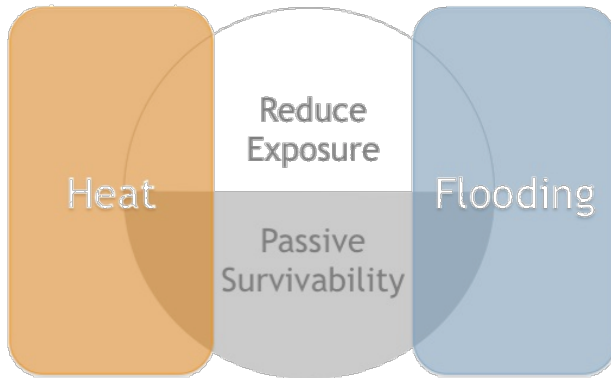
Determinants of Health	Public Health Resilience Outcomes	Built Environment Resilience Outcomes
Air pollution	Heat- / flood-related morbidity & mortality	Mitigate heat island effect
Access to opportunities to exercise	Cardiovascular disease	Development in areas with existing services
Biodiversity in urban environments	Interface between wildlife & humans	Cluster development to increase density
Dependence on automobiles	Infectious disease (i.e., malaria, etc.)	Access to local, productive agricultural land
Disease-carrying vectors	Mental health & wellbeing	Native vegetation, street trees, pervious surface
Food / nutrition safety & security	Respiratory disease	Reduce ground-level ozone
Habitat fragmentation	Undernutrition & malnutrition	
Population density	Neighbors check on socially-isolated neighbors	
Street connectivity, Walkability		

# Green Building & Climate Change Vulnerability

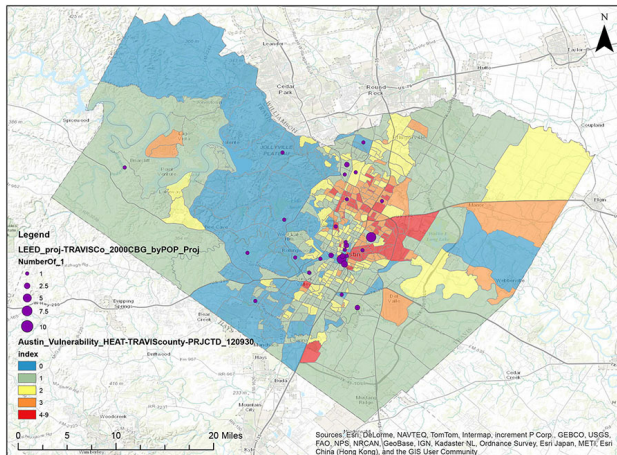
## Credit Groupings



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# GBIG Climate & Health Resilience Collections

## Coming Soon!

**GBIG** The Green Building Information Gateway

SIGN IN ABOUT Search

**ACTIVITIES**  
Green Events & Projects

**BUILDINGS**  
Green Structures

**PLACES**  
Cities, States & Countries

**STRATEGIES**  
Processes & Practices

**COLLECTIONS**  
Groups & Project Portfolios

Home » Collections

Explore connections between projects, people, products, and services

Learn more about the Downtown DC BID

View »

FEATURED COLLECTIONS View all 2,433 Published GBIG Collections

**AtSite**  
15 activities  
AtSite Smart Building Solutions

**INsIGHT TECHNICAL REPORT**  
2,657 activities  
Report: Geographic & Temporal Patterns in Green Building Practice

**Akridge**  
57 activities  
Akridge

**DODGE Reports**  
133 activities  
McGraw-Hill Construction Dodge Reports

**BuildingGreen.com**  
173 activities  
Projects with BuildingGreen Case Studies

**Climate Change Resilience**  
222 activities  
Policy: LEED certified in San Francisco since August 2008

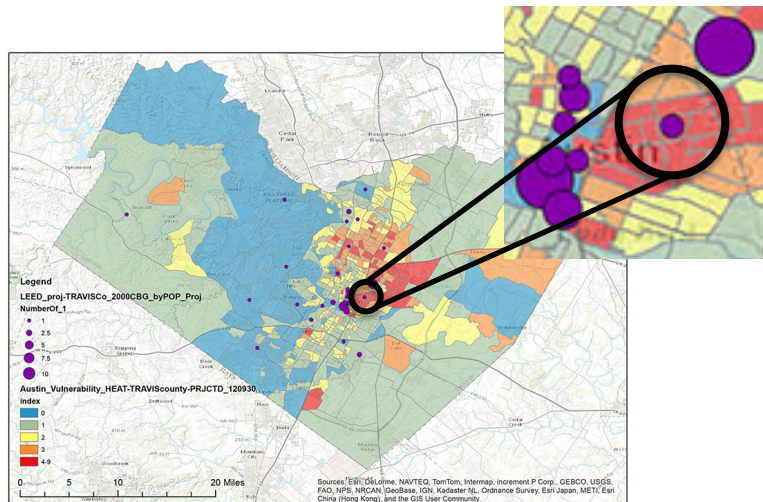
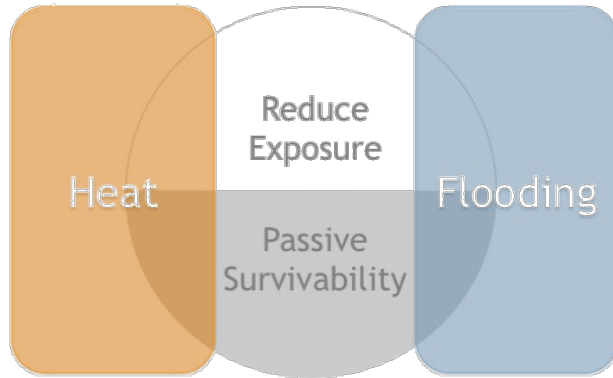
**TYPES OF COLLECTIONS**

- Utilities
- Metropolitan Statistical Areas
- USGBC Chapters
- EPA Regions
- ASHRAE Climate Zone
- NCHS Urban Rural Classification
- Technologies
- Space Type
- Report
- Climate Change Resilience**



# Health Impact Assessments

## Tool for Green Building Design - Austin example



LEED Credits (description)	Heat B	Heat C	Heat D
<b>SSc1: Site Selection</b> <i>Avoid building on: prime farmland; land in 100-year flood plain; endangered species habitat; land within 100 feet of wetlands or 50 feet of water bodies; park land.</i>	✓		✓
<b>SSc2: Development Density and Community Connectivity</b> <i>Locate project in a dense urban area or close to both a residential area and at least 10 basic services (i.e., grocery stores, etc.)</i>	✓		✓
<b>SSc5.1: Site Development—Protect or Restore Habitat</b> <i>Limit disturbance of habitat on greenfield sites. Restore habitat on previously developed habitat.</i>	✓		✓
<b>SSc5.2: Site Development—Maximize Open Space</b> <i>Increase vegetated open space.</i>	✓		✓
<b>SSc6.1: Stormwater Design—Quantity Control</b> <i>Reduce the volume of stormwater that leaves the site after heavy precipitation events.</i>	✓		✓
<b>SSc6.2: Stormwater Design—Quality Control</b> <i>Clean stormwater of total suspended solids.</i>	✓		✓
<b>SSc7.1: Heat Island Effect—Nonroof</b> <i>Install light colored and pervious paving (i.e., roads, sidewalks, parking lots, etc) or place at least 1/2 of all parking spaces under cover.</i>	✓		✓
<b>SSc7.2: Heat Island Effect—Roof</b> <i>Install light colored or vegetated roofs.</i>	✓		✓
<b>EAc1: Optimize Energy Performance</b> <i>Reduce energy use in the building.</i>		✓	✓
<b>EAc2: On-Site Renewable Energy</b> <i>On-site installation of solar, wind, or other renewable energy source.</i>		✓	✓
<b>EAc3: Enhanced Commissioning</b> <i>Perform commissioning (i.e., quality control) on all energy, domestic hot water, lighting, and renewable energy systems. Review building operations within 10 months after substantial completion of construction.</i>		✓	✓
<b>IEQc7.1: Thermal Comfort—Design</b> <i>Design air conditioning (HVAC) systems and building envelope to meet standards for temperature, humidity, and airflow.</i>		✓	✓

# Concluding Questions

- Why aren't HIAs applied more often at the development scale?
- What are the barriers to incorporating them into the design process?
- If they were incorporated...
  - How would HIAs improve design?
  - How would a design influenced by HIA recommendations improve population health?



# Acknowledgements

- Professors Carlos Castillo-Salgado & Brian Schwartz, Johns Hopkins Bloomberg School of Public Health
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- Dr. George Luber & Natasha Prudent, CDC Climate Change Program
- Dr. Christopher Pyke & Sean McMahon, U.S. Green Building Council
- Lipitz Policy Award, Johns Hopkins Bloomberg School of Public Health

# Thank You.

# Questions?

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